

**We claim:**

1. A process for preparing alpha, beta-unsaturated acyclic or cyclic carbonyl compounds by dehydrogenation of the corresponding saturated carbonyl compounds in the gas phase over a heterogeneous dehydrogenation catalyst comprising platinum and/or palladium and tin on an oxidic support.
2. A process as claimed in claim 1, wherein the oxidic support is selected from the group consisting of zirconium dioxide, aluminum oxide, silicon dioxide, titanium dioxide, magnesium oxide, lanthanum oxide and cerium oxide.
3. A process as claimed in claim 1 or 2, wherein the dehydrogenation catalyst comprises zirconium dioxide and/or silicon dioxide.
4. A process as claimed in any of claims 1 to 3, wherein the dehydrogenation catalyst further comprises at least one element of main group I or II and at least one element of transition group III including the lanthanides and actinides.
5. A process as claimed in any of claims 1 to 4, wherein the dehydrogenation catalyst comprises cesium and/or potassium.
6. A process as claimed in any of claims 1 to 5, wherein the dehydrogenation catalyst comprises lanthanum and/or cerium.
7. A process as claimed in any of claims 1 to 6, wherein the dehydrogenation is carried out in the presence of molecular oxygen under autothermal conditions.
8. A process as claimed in any of claims 1 to 7 in which a regenerated dehydrogenation catalyst is used and the regeneration comprises at least the following step:  
passing an oxygen-containing gas mixture comprising an inert gas through the catalyst bed at a pressure of from 2 to 20 bar and a space velocity of gas of from 1000 to 50 000 h<sup>-1</sup> for a period of from 0.25 to 24 hours while increasing the oxygen concentration either stepwise or continuously from an initial value of 0.01-1% by volume of O<sub>2</sub> to a final value of 10-25% by volume of O<sub>2</sub>.

9. A process as claimed in claim 8, wherein the regeneration of the dehydrogenation catalyst comprises the steps (a), (b) and (e) and, if desired, (c), (d) and (f):

5 (a) flushing with inert gas at a pressure of from 0.5 to 2.0 bar and a space velocity of gas of from 1000 to 50 000 h<sup>-1</sup>;

10 (b) passing an oxygen-containing gas mixture comprising an inert gas through the catalyst bed at a pressure of from 2 to 20 bar and a space velocity of gas of from 1000 to 50 000 h<sup>-1</sup> for a period of from 0.25 to 24 hours while increasing the oxygen concentration either stepwise or continuously from an initial value of 0.01-1% by volume of O<sub>2</sub> to a final value of 10-25% by volume of O<sub>2</sub>;

15 (c) if desired, passing an oxygen-containing gas mixture comprising an inert gas through the catalyst at a pressure of from 0.5 to 20 bar and a space velocity of gas of from 10 to 500 h<sup>-1</sup> over a period of from 0.25 to 100 hours, with the oxygen concentration being from 10 to 25% by volume of O<sub>2</sub>;

(d) if desired, repeatedly carrying out rapid opposite pressure changes by a factor of from 2 to 20 within the range from 0.5 to 20 bar;

(e) flushing with an inert gas;

20 (f) activation of the catalyst by means of hydrogen;

where at least one of the steps (c) or (d) is carried out and the entire regeneration process is carried out at from 300 to 800°C.

25 10. A process as claimed in claim 8 or 9, wherein steps (b) and, if applicable, (c) are carried out at > 500°C.

11. A process as claimed in any of claims 1 to 10, wherein the cyclic or acyclic carbonyl compounds are cyclic or acyclic aldehydes or ketones.

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12. A process as claimed in claim 11, wherein an acyclic aldehyde or ketone selected from the group consisting of propionaldehyde, butyraldehyde, valeraldehyde, isovaleraldehyde, butanone, 2-pentanone and 2-hexanone is dehydrogenated.

35 13. A process as claimed in claim 11, wherein a cyclic ketone selected from the group consisting of cyclopentanone, cyclohexanone and cycloheptanone is dehydrogenated.

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14. The use of the regenerated dehydrogenation catalyst as defined in any of claims 8 to 10 in the process as claimed in claim 1.